The mucous membrane is swollen and the patient has a disagreeable sensation of tumefaction for several days, after which it disappears. In many cases, within twenty-four hours the sneezing and disagreeable nasal irritation typical of hay fever disappears permanently. In a few cases the trouble has returned the following season and the patient had to submit to a second treatment. In cases where the results have not been good, the trouble appears to be due to faulty technique by which the alcohol escaped into the throat, or due to improper insertion of the needle, it may have passed through the turbinates and escaped behind into the pharynx. It is not as easy to confine the alcohol entirely to the turbinates as one would suppose and if particular care is not used more or less of it will be lost. When the alcohol is properly injected under local anesthesia, more or less intense pain immediately follows, whereas when it is not properly placed there is no pain. This in one way is a benefit as one can feel assured when the pain immediately follows the injections that the alcohol has been properly placed. Lately I have tried H. M. C. Compound hypodermatically together with local anesthesia which has seemed to lessen the pain somewhat. It is possible that this with local anesthesia will prove sufficient without resorting to a general anesthetic. Submucous resections and other operations may be combined with this treatment.

CASE REPORTS

One case reported in my former paper of August, 1919, was of a young man age 17, who had suffered for years from hay fever, so severe that each summer he was unable to work. He was treated four years ago and within a week was entirely relieved and able to work in the hay field with no return of the trouble. In a recent report he states that he has been entirely cured and is now having no trouble whatever.

Abstracts from the records of a few additional cases are submitted:

Miss H., age about 30 years, complained of hay fever for six or seven years. As a result of the trouble she was compelled to go to the coast each summer. She was given the alcohol injection on June 2, 1919, since which time she has had no return of the disease.

Mr. E., age about 65 years, referred to me by the mother of the young man previously mentioned in the former article. Mr. E. had suffered for twenty-five years from hay fever; had traveled extensively seeking relief and consulted numerous physicians without benefit. One treatment gave him complete relief.

Mr. T., age 19, had suffered for years. Was treated in 1919 and has had no return of the trouble to this date.

Mrs. C., age 19, treated six years ago. She was a severe sufferer from hay fever, practically an invalid during the summer months. A report received from her during the past week advises that she has been practically free from hay fever since the treatment.

Many other cases might be reported.

CONCLUSION

The great benefit of my method is that one treatment is usually all that is required to give permanent relief, whereas with vaccines many injections are required and the treatment must be kept up indefinitely. With the alcoholic treatment I obtain a cure or relief in 90 per cent of cases.

THE EFFECT OF MASSAGE, HEAT AND EXERCISE ON THE LOCAL CIRCULATION*

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Despite the value of physiotherapeutic methods in the treatment of diseases which involve the extremities, we are still relatively ignorant of the manner in which these produce their beneficial effects. This is so largely because the study of joint and muscle functions has hardly advanced beyond the simplest measurements of motion and strength. Broadly speaking, physiotherapy is still in an empiric stage. Its methods have been and are being developed by the method of countless trials in one direction or another. The rational explanation of the results obtained is still fragmentary and scientific studies have not advanced sufficiently far in this field to give to physiotherapy the assistance already given to drug therapy and to treatment by the methods of immunology. None the less, a consideration even of certain functional changes, produced by physical methods of treatment, helps to clarify one's conception of what is happening in the tissues during the treatments.

My interest in this subject was awakened by studies on the blood flow in the arm which were carried out several years ago in association with J. G. Van Zwalenburg and others. These studies demonstrated plainly that the blood flow in the arm was readily and markedly influenced by certain physiotherapeutic procedures and that it was relatively unaffected by powerful drugs given in full therapeutic doses. Though our experiments have been published for some time it may yet be of interest to review the results, together with results of others, on account of the light they throw on certain methods commonly used in physiotherapy.

The arm is composed of skin, muscle and bone, together with various connecting tissues. Changes of circulation which occur in the arm may be assumed to occur under similar conditions at other portions of the surface of the body, where skin, muscle and bone make up the major part of the tissue.

It is well known that heat tends to increase the amount of blood in the heated tissues. The arm is said to swell as much as 70 c.c. when heated. Cold, if not too intense and too prolonged, has an opposite effect. Rings, gloves and shoes fit more loosely when one is chilly and more tightly when one is warm. These changes in volume are accompanied by corresponding changes in the rate of blood flow. The continued application of hot water to the arm increases the local rate of blood flow from four to eight times, and the continued application of cold causes the local rate to fall to one-half or one-fourth of the original. In one of our experiments, for example, the range of blood flow in the arm as a result of thermic influences varied from 2 to 40 c.c. per 100 c.c. of arm substance per minute.

The increased rate of blood flow produced by

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heat is not a purely local phenomenon. Shortly after one arm is plunged into hot water the blood flow is increased not only in this arm but also in the opposite one, the latter being less markedly affected. In general the application of heat to any portion of the periphery of the body causes not only a local increase of blood flow but it appears to cause an increased circulation in all portions of the body surface. The response of distant portions of the surface is often so prompt that it must be due in part to nervous reflexes.

Thermic influences may bring about a redistribution of blood in still a third way. This is through an alteration in the body temperature. We know that if a person becomes overheated, the heat-regulatory centers throw into operation all those mechanisms which serve to lower the body temperature. Most important of these is an increased rate of blood flow through the surface covering of the body. This warms the skin and so increases the heat losses from the body. The central mechanism which regulates the body temperature is sensitive to slight alterations in the temperature of the blood which comes to it. If any procedure raises the temperature of the body, even slightly, then the regulatory mechanism tends to send more blood to the periphery of the body in order to reduce the temperature. Thus we see that thermic influences alter the rate of circulation at the surface of the body in three distinct ways: (1) through their local effects, (2) through reflex influences, and (3) through altering slightly the temperature of the blood which goes to the brain.

This latter appears to me to be of paramount importance in securing a good reaction after the cold procedures. Every hydrotherapeutist knows that the patient must not be allowed to become chilly after a cold procedure and the whole technic of general hydrotherapy is designed so as to obtain that feeling of warmth and comfort which characterizes a good reaction. This is accomplished largely by measures which prevent heat losses from the body. The rooms are kept warm, the patient is given a preliminary hot treatment, and the cold procedure is made very brief. The heat added to the body during the preliminary treatment more than compensates for what is extracted during the cold procedure. The temperature of the body is a little elevated; and although the cold procedure by its local effect drives the blood from the surface, the latter soon returns after the cold is removed and the skin remains warm because of the slight increase in body temperature. Vigorous persons commonly forego the refinements of the hydrotherapeutic institute and obtain reactions in cold rooms and without preliminary hot procedures. It appears to me that they are able to do this largely because vigorous exercise during the bath liberates heat within the body. This liberation, combined with a constriction of surface blood vessels during the cold procedure, more than overcomes the tendency of the cold to extract heat from the body. At the end of such a cold bath the body temperature is actually higher than at the beginning and the individual is left with a pleasing feeling of warmth that persists after the bath is over. In the course of the experiments referred to above, I took not a few cold showers after my body temperature had been slightly reduced by prolonged exposure; and I can testify that under such circumstances even one who ordinarily reacts well and who is comfortable during and immediately after the shower is apt shortly to experience intense chilliness that persists until the body temperature has finally been raised to the proper level. Thus it seems to me that one of the essential conditions for an enduring reaction after a cold procedure is a maintenance or even a slight elevation of the body temperature as a net result of the entire procedure. This ensures the continued feeling of warmth and the normal or increased blood flow to the surface that characterizes a good reaction.

The blood flow through the arm is accelerated not only by heat but also by the voluntary use of the local muscles. We found, for example, that the rate of blood flow in the arm may be increased to from three to eight times the resting flow by rapidly opening and closing the fist. Of no little interest are those observations made by others which indicate that this increase of blood flow during exercise depends less upon the mechanical effect of the motion than upon vasomotor effects caused by voluntary innervation of the muscles used. Muscular contractions produced in animals by stimulating the local nerves seem to have been much less effective in accelerating the local blood flow than the muscular contractions produced by voluntary innervation. Furthermore Weber reported that marked swelling of the arm may be produced in motionless persons during hypnotic sleep merely by the suggestion of motion in this arm. Thus it would appear that the marked increase in local blood flow which accompanies muscular movements is due largely to the voluntary effort made to use the muscles. Here we have suggestive physiologic grounds for encouraging a patient repeatedly to make the effort to use an extremity provided use is desired; even though on account of injury or disease he can actually move it very little.

So far as the local blood flow is concerned, massage is not the equivalent of exercise. Exercise causes a marked swelling of the arm due to the increased amount of blood that it contains, but massage produces no appreciable effect upon the arm volume. Under suitable conditions therefore massage should be combined with voluntary efforts on the part of the patient to use his muscles.

We have seen that two types of procedure commonly used in physiotherapy have an extraordinary effect in accelerating the blood flow through an extremity. These are the voluntary use of the muscles and the application of heat either local or general; and I may repeat that no medicine produces an effect even remotely comparable to that caused by these physical methods. It seems to me evident that such a marked acceleration of the circulation as is produced by these means cannot be without influence upon local disease.